COLLIN COUNTY COMMUNITY COLLEGE
COURSE SYLLABUS

COURSE NUMBER: MATH 1325

COURSE TITLE: Calculus for Business and Social Sciences I

CREDIT HOURS: 3  LECTURE HOURS: 3  LAB HOURS: 1

PREREQUISITE: MATH 1314, or MATH 1324, or MATH 1414; or equivalent.

COURSE DESCRIPTION: This course is the basic study of limits and continuity, differentiation, optimization and graphing, and integration of elementary functions, with emphasis on applications in business, economics, and social sciences. This course is not a substitute for MATH 2413 – Calculus I. Graphing calculator required. Lab required.


SUPPLIES: Graphing calculator required

STUDENT LEARNING OUTCOMES:
Upon successful completion of this course, students will:

1. Apply calculus to solve business, economics, and social sciences problems. (Communication Skills/Critical Thinking)
2. Apply appropriate differentiation techniques to obtain derivatives of various functions, including logarithmic and exponential functions. (Empirical/Quantitative Skills)
3. Solve application problems involving implicit differentiation and related rates. (Communication Skills, Critical Thinking)
4. Solve optimization problems with emphasis on business and social sciences applications. (Communication Skills, Critical Thinking)
5. Determine appropriate technique(s) of integration. (Empirical/Quantitative Skills, Critical Thinking)
6. Integrate functions using the method of integration by parts or substitution, as appropriate. (Empirical/Quantitative Skills, Critical Thinking)
7. Solve business, economics, and social sciences applications problems using integration techniques. (Communication Skills, Critical Thinking)

COURSE REQUIREMENTS: Attending lectures, completing assignments, completing required exams and labs, and knowledge of calculator use are all required.

COURSE FORMAT: Lecture, lab and guided practice.

METHOD OF EVALUATION: A minimum of four proctored exams, a lab component grade,
and a proctored comprehensive final exam will be given. Homework and/or quizzes may be used in place of one exam or in addition to exams. The weight of each of these components of evaluation will be specified in the individual instructor’s addendum to this syllabus. All out-of-class course credit, including home assignments, service-learning, etc. may not exceed 25% of the total course grade; thus, at least 75% of a student’s grade must consist of proctored exams, and no student may retake any of these exams.

**LAB STATEMENT:** Labs are opportunities for students to apply the concepts taught in class. They fulfill the course’s learning outcomes while assessing the core objectives skills of critical thinking, communication, and empirical/quantitative analysis. The lab assignments must be completed outside of class and labs will be graded and recorded as part of the grading process. Lab credits should count for 10% - 25% of the overall course grade.

**ATTENDANCE POLICY:** Attendance is expected of all students. If a student is unable to attend, it is his/her responsibility to contact the instructor to obtain assignments. Please see the schedule of classes for the last day to withdraw from the course with a grade of W.

**RELIGIOUS HOLY DAYS:** In accordance with section 51.911 of the Texas Education Code, the college will allow a student who is absent from class for the observance of a religious holy day to take an examination or complete an assignment scheduled for that day within a reasonable time. A copy of the state rules and procedures regarding holy days and the form for notification of absence from each class under this provision are available from the Admissions and Records Office. Please refer to the current Collins Student Handbook.

**ADA STATEMENT:** Collin College will adhere to all applicable federal, state and local laws, regulations and guidelines with respect to providing reasonable accommodations as required to afford equal educational opportunity. It is the student's responsibility to contact the ACCESS Office, SCC-D140 or 972.881.5898, (V/TDD 972.881.5950) to arrange for appropriate accommodations. See the current Collins student Handbook for additional information.

**ACADEMIC ETHICS:** Please see section 7-2.2 of the Collins Student Handbook. Contact the Dean of Students at 972.881.5771 for the student disciplinary process and procedures.

**COURSE CONTENT:** Proofs and derivations will be assigned at the discretion of the instructor. The student will be responsible for knowing all definition and statements of theorems for each section outlined in the following modules.

**MODULE 1: LIMITS, CONTINUITY AND THE DERIVATIVE**

The student will be able to:

1. Find limits by constructing a table of values.
2. Find limits by direct substitution and rules of limits.
3. Find limits by factoring and rationalization of the numerator or denominator.
4. Find one-sided limits.
5. Find limits by examining a given graph.
6. To evaluate limits as \( x \) approaches \(+\infty\) or \(-\infty\).
7. Use the definition of continuity to show a given function is continuous at an indicated point.
8. Find points of discontinuity of a given function.
9. Determine if a function has an infinite limit at a point of discontinuity.
10. Find and interpret average rate of change over an interval.
11. Find and interpret instantaneous rate of change at a value.
12. Estimate the slope of the tangent line to a curve.
13. Find the slope and equation of a secant line given two points.
14. Find the slope and equation of a tangent line to a curve.
15. Use the limit definition of the derivative to find the derivative of a polynomial, rational, or square root function.
16. Determine the existence of the derivative by examining a given graph.
17. Sketch the graph of the derivative of a function given its graph.

**MODULE 2: MORE DERIVATIVES**

The student will be able to:

1. Find the derivative of a function using the constant, power, sum, and difference rules.
2. Apply marginal analysis to cost, revenue, and profit functions.
3. Find the derivative of a function using the product rule or quotient rule.
4. Find the marginal average revenue, marginal average cost, and marginal average profit.
5. Find the derivative using the chain rule.
6. Find the derivative of exponential functions.
7. Find the derivative of logarithmic functions.

**MODULE 3: GRAPHS AND CURVE SKETCHING**

The student will be able to:

1. Find the critical numbers of a function.
2. Use a sign chart to find the intervals where a function is increasing or decreasing.
3. Use the first derivative test to find relative extrema.
4. Sketch the graph of a function using the information obtained from the first derivative.
5. Find the \( n^{th} \) derivative of a function.
6. Use a sign chart to find the point(s) of inflection of a graph.
7. Use a sign chart to find the intervals where a function is concave up or concave down.
8. Use the second derivative test to find relative extrema.
9. Use a sign chart to sketch curves by analyzing the first and second derivatives.
10. Analyze the definition of a function to locate horizontal, oblique, and vertical asymptotes, and hole(s) of the graph.

**MODULE 4: ADDITIONAL DERIVATIVE TOPICS**
The student will be able to:

1. Use the Extreme Value Theorem to find absolute extrema.
2. Solve optimization problems.
4. Solve Order Quantity problems.
5. Solve Elasticity of Demand problems.
6. Find derivatives by using implicit differentiation.
7. Find slopes of tangents by using implicit differentiation.
8. Solve related rate problems.
9. Use differentials to approximate increments.
10. Use L’Hôpital’s Rule to find limits of functions.

**MODULE 5: INTEGRATION**

The student will be able to:

1. Given a function, find its antiderivative or integral using the basic integration formulas.
2. Find the indefinite integral of an exponential function.
3. Given initial conditions, find the constant of integration.
4. Given the marginal revenue function or marginal cost function, find the demand or total cost function.
5. Find the indefinite integral using substitution.
6. Use the sum of areas of rectangles to approximate area under a curve.
7. Evaluate definite integrals using the Fundamental Theorem of Calculus.
8. Find the average value of a function between $x = a$ and $x = b$.
9. Solve first order differential equations involving Growth and Decay by separation of variables.